I CLAIM:

1. A method of applying a spray-applied substance layer upon a structural surface, such as a building roof or other terrestrial surfaces, comprising the steps of continously applying said substance in liquid form in adjacent linearly extending bands of said substance as a coating of a resultant solid layer of said substance, upon said roof, from a spray applicator source in alternate directions transverse to an axial direction of each band of said bands of said substance, each said band having a predetermined width and axial length,

subjecting said spray applicator source of said substance in liquid form to an arcuate uphill movement at each end portion of each said transverse movement of said spray applicator source of said substance in liquid form, wherein said transverse movement of said spray applicator source of said substance in liquid form accelerates in speed,

tilting said spray application source of substance in liquid form outward as said spray applicator source of said substance in liquid form moves arcuately uphill, thereby reducing the amount of said substance in liquid form being applied to said respective edge portions of each said band of said substance upon the structural surface at an end of each pass of said spray applicator source across each said linearly extending band of said substance.

2. A method of applying a solid roofing polyurethane foam layer upon a structural surface, such as a building roof or other terrestrial surfaces, comprising the steps of continously applying said substance in liquid form in adjacent linearly extending bands of foam as a coating of a resultant solid foam layer upon said roof, from a foam applicator source in alternate directions transverse to an axial direction of each band of said bands of said foam, each said band having a predetermined width and axial length,

subjecting said applicator source of foam to an arcuate uphill movement at each end portion of each said transverse movement of said applicator source of liquid form, wherein said transverse movement of said foam applicator source of liquid form accelerates in speed,

tilting said foam applicator source of liquid form outward as said foam applicator source of liquid form moves arcuately uphill, thereby reducing the amount of said liquid form applied to said respective edge portions of each said band of foam upon the roof at an end of each pass of said liquid foam applicator source across each said linearly extending band of foam.

3. The method as in Claim 2 wherein said foam applicator source is a nozzle.

4. The method as in Claim 2 wherein said step of applying said liquid foam in alternately directions transverse to an axial direction of each said band of said foam further comprises the step of moving said foam applicator source transversely along at least one track extending transverse to said axial direction of each said band of said liquid foam.

5. The method as in Claim 4 wherein a radially extending swinging arm with a telescoping slide mechanism provides said transverse movement of said foam applicator source along said at least one track, so that said foam applicator source moves linearly instead of arcuately, as said swinging arm pivots about a pivot fulcrum point.

6. The method as in Claim 4 further comprising the steps of controlling thickness of said liquid foam upon the roof by varying a rate of flow of discharge of said liquid foam emanating from said foam applicator source, whereby ground movement speed of said transverse movements of said foam applicator source determines the weight of said coating of foam per unit area applied, to determine the thickness of said resultant solid foam layer.

7. The method as in Claim 6 further comprising the step of applying a slope on the portion of said resultant solid foam layer roof, such as toward a drain, by reducing said ground movement speed of said foam applicator source on successive passes away and parallel to a drainage line of said drain, resulting in a stepwise slope approximating a predetermined contour of said drain.

8. The method as in Claim 4 further comprising the step of tilting said foam applicator source a predetermined amount cyclically as said foam applicator source moves transversely along said track, thereby minimizing variation in foam thickness in the form of rounded ridges due to a hollow-cone pattern of the application of said liquid foam from said foam applicator source.

9. The method as in Claim 4 further comprising the step of applying a layer of fabric from a fabric roll to said layer of liquid foam, thereby reinforcing said solid foam layer with said fabric layer, whereby during solidification of said liquid foam, said fabric layer becomes imbedded in said resultant solid foam layer.

10. The method as in Claim 4 further comprising the step of applying an elastomeric sheet covering over said liquid foam layer, thereby forming a coating skin over said resultant solid foam layer.

11. A spray applicator apparatus for applying spray coated layers in axially extending bands of predetermined widths, in uniform thicknesses upon a structural surface in field applications, such as roofing applications or pavement applications, comprising:

a spray applicator vehicle having a frame,

said frame supporting a movement power source, moving said vehicle, said frame further supporting at least one steerable powered wheel, and a swinging boom moving a liquid coating applicator source transversely along at least one track,

said boom having a laterally movable telescoping end attachable to said liquid coating applicator source, and,

said frame having at least one track constraining movement of said liquid coating applicator source in a linear path transverse to axial movement of said frame across said structure surface.

12. The spray applicator as in Claim 11 wherein said liquid coating applicator source comprises at least two separate conduits, each said conduit carrying a respective liquid, said respective liquids being mixed within a mixing

discharge valve of said liquid coating applicator source for spraying said liquid coating through a nozzle from a remote pressurized source to said structural surface.

13. The spray applicator apparatus as in Claim 12 further comprising said mixing discharge valve being located at said nozzle just prior to a discharge output of said nozzle, wherein said mixing valve mixes said liquids to chemically cause an exothermic foaming and hardening reaction of said spray coated layer of said liquid coating from a liquid foam into a resultant solid foam layer.

14. The spray applicator apparatus as in Claim 13 further comprising a solenoid actuated by a switch in a control unit operating said mixing discharge valve at said nozzle.

15. The spray applicator apparatus as in Claim 11 further comprising a means to limit the amount of liquid coating discharged to prevent "double coating" at respective edges of a layer of said coating,

said means comprising at least one geometrically variable track having a linear portion extending transverse to said layer of coating in a middle of a transverse sweep of said liquid coating applicator source,

said at least one geometrically variable track being curved at respective distal ends thereof in a constant radius,

whereby said curved distal ends limit travel of said liquid coating applicator, whereby the speed of said liquid coating applicator source is accelerated at respective ends of transverse travel upon said at least one track due to the greater distance traveled per unit time on said curved distal ends of said track, as well as due to change in direction.

16. The spray applicator apparatus as in Claim 15 wherein said liquid coating applicator source is tilted outward at said curved ends of said track to provide a larger coverage area than when said liquid coating applicator source travels linearly along a straight mid portion of said at least one track, thereby reducing the thickness of the

sprayed layer of liquid coating at said respective distal edges thereof.

17. The spray applicator apparatus as in Claim 15 wherein said at least one track comprises a pair of rails, said liquid coating applicator source riding upon a carriage moveable upon said pair of rails.

18. The spray applicator apparatus as in Claim 12 further comprising a nutating means automatically moving said liquid coating applicator source through an adjustable stroke transverse to said at least one track several times on each pass of said liquid coating applicator to counteract variations in layer thicknesses resulting from a hollow cone spray pattern of said liquid coating applicator source.

19. The spray applicator apparatus as in Claim 18 wherein said nutating means is an oscillator.

20. The spray applicator apparatus as in Claim 18 wherein said nutating means comprises a first bracket with a pivot therein, said first bracket holding a nozzle of said liquid foam applicator source, said first bracket fastenable to a carriage plate carrying said nozzle,

said nutating means further having a push-pull coupling assembly including a housing with a coupling therein, said coupling actuating cyclic motion of a holder for said nozzle,

said nutating means having a powering end connected to said coupling, said nutating means having a further bracket attached to said frame of said spray applicator apparatus in the vicinity of a gear box,

said nutating means further having a pivotable cam follower pivotable about a pivot point within an adjustment slot,

said cam follower biased toward a multiple lobe cam by a spring, wherein a stroke of a said coupling controlling the amount of cyclic tilt of said nozzle is determined by predetermined dimensions and geometry of said cam follower and a predetermined depth of each lobe on said cam,

wherein in a predetermined centering of motion of said nozzle is adjusted by moving said pivot point within said slot,

said cam being attachable to an output shaft of said gear box, said nozzle being cycled by movement of each said cam lobe as said multiple lobe cam rotates,

wherein movement of said cam follower out of contact with said multiple lobe cam and tightening said cam follower in a locked position defeats said pivoting of said nozzle, thereby locking said nozzle in a vertical spray position to deactivate said nutating means.

21. The spray applicator apparatus as in Claim 20 wherein said coupling is a cable wire.

22. The spray applicator apparatus as in Claim 18 wherein said nutating means is a crank coupling and gear motor assembly connected to said liquid coating applicator source, wherein a stroke of said crank coupling controls the amount of cyclic tilt of a nozzle of said liquid coating applicator source.

23. The spray applicator apparatus as in Claim 12 wherein said movement power source further comprises a remote control communicating with said movement power source to move said spray applicator remotely.

24. The spray applicator apparatus as in Claim 12 wherein said vehicle is assembled and disassembled as a modular unit for easy transport to the roof of a building on an elevator or by using a winch, further comprising:

said boom being alternately attachable to and removable from said frame of said vehicle by removal of a fastener therebetween,

said liquid coating applicator source being alternately attached to and removable from said at least one track,

said at least one track being removable from said frame by removing a first further fastener therebetween,

said at least one steerable powered wheel being attachable to a driven wheel subassembly including an operator seat and a steering wheel, said driven wheel subassembly being alternately attachable to and removable from said frame by removal of a second further fastener therebetween,

said power source having a plurality of electrical connections, connecting said applicator source, said power source and said at least one powered wheel,

wherein upon disassembly of said modular unit, said boom, said liquid coating applicator source, said at least one track, said frame, said at least one steerable powered wheel, said driven wheel subassembly, including said operator seat and said steering wheel, are transportable separately to said roof for reassembly of said modular unit thereat.

25. The spray applicator apparatus as in Claim 12 wherein said power source comprises a control box removably attachable to said frame, said control box connectable to standard AC mains via an electrical connection, said power source further comprising a motor,

said control box having at least one AC/DC converter supplying current to at least one DC load,

said power source having an AC power switch controlling power to said spray applicator apparatus,

said at least one converter supplying DC power to a uni-directional speed control with a digital speed indicator and a speed set control, maintaining constant output speed of said motor for swinging of said boom via a feedback from a motor mounted encoder,

said power source having a switch controlling power to a solenoid which said solenoid opens said discharge valve of a said nozzle of said liquid coating application source,

said power source having a further converter supply DC power to a bi-directional PID speed control with a digital speed indicator and a speed set control, said speed set control accurately and repeatedly maintaining the ground speed in either direction of said spray applicator apparatus as set under varying load conditions by virtue of said motor mounted feedback encoder, for determining the thickness of the resulting sprayed layer of foam,

said power source having a further control switch determining the direction of movement as forward or reverse, and,

said power source having a second bi-directional speed control for quickly selecting a desired ground speed via an optional manual control when it is desired to maneuver said spray applicator apparatus prior or after an application of said liquid coating.

26. The spray applicator apparatus as in Claim 23 wherein said remote control device comprises a hand-held remote control box with a face plate and a plurality of functional units,

said at least one steerable wheel being controllable by an electric steering ram, said electric steering ram controllable by a positional steering control setting the position of a steered wheel to match that of a steering control wheel connected to said at least one steerable wheel, and

said remote control device communicating with said power source via a remote communications means.

27. The spray applicator apparatus as in Claim 23 wherein said remote communications means is a radio communications channel.

28. The spray applicator apparatus as in Claim 23 wherein said remote communications means is a coiled cable.

29. The spray applicator apparatus as in Claim 12 further comprising a means for adhesively bonding a sheet of an elastomeric roofing substrate layer.

30. The spray applicator apparatus as in Claim 29 wherein said means for adhesively bonding a sheet of elastomeric roofing substrate layer comprises a roll of elastomeric sheet being pivotable at an end of a pair of linking arms connecting said roll to said frame,

said roll being urged flat by a trailing weighted roller applying even pressure to said sheet layer, said liquid coating applicator source spraying a layer of bonding adhesive, which said adhesive bonds said roof surface to said sheet.

31. The spray applicator apparatus as in Claim 12 further comprising a means for reinforcing said liquid coating with reinforcing fabric, said means comprising a roll

of fabric pivotable at an end of a pair of linking arms connecting said roll to said frame,

said fabric being urged flat by a trailing weighted roller applying even pressure to said fabric, said fabric being applied into said applied liquid foam before said coating rises to a resultant solid coating layer wherein said reinforcing fabric is embedded in said resultant solid coating layer.

32. The spray applicator apparatus as in Claim 31 wherein said liquid coating is polyurethane foam.

33. A fabric reinforced polyurethane foam roofing coating substrate comprising a solidified polyurethane foam layer having a fabric reinforced layer imbedded within said solidified polyurethane foam layer.

34. The fabric reinforced polyurethane foam roofing coating substrate as in Claim 23, wherein said fabric reinforced layer is selected from the group consisting of nylon, fiberglass and aramid.

35. A new and useful industrial robotic device for applying coatings or other spray coated layers, in uniform thicknesses and at appropriate angles of pitch, in field applications, such as roofing applications or pavement applications, comprising:

a movable spray applicator dispenser including at least one nozzle for discharge of at least one foam layer to a surface, said spray applicator movable along at least one linear track having a curved surface, said at least one linear track engagable with a corresponding curved surface of at least one wheel attached to said foam applicator, wherein transverse to said curved engaging portion of said at least one linear track there is provided arcuate uphill distal end portions of said at least one track, wherein said movable spray applicator dispenser, moving along said at least one linear track, tilts and accelerates in speed as said movable spray applicator dispenser rolls up each respective said curved uphill portions, thereby reducing the amount of foam applied to an edge portion of the roof at the end of a pass of said movable spray applicator dispenser.

36. The device as in Claim 35, wherein said at least one track and said at least one wheel comprise a pair of tracks and a pair of wheels.

37. The device as in Claim 35, wherein said at least one wheel comprises a curved wheel when viewed in cross section, so that said curved wheel fits against and moves along a curved surface of an edge of said at least one track.

38. The device as in Claim 35 further comprising a radially extending swinging arm providing transverse sideways movement of said movable spray applicator dispenser along said at least one track.

39. The device as in Claim 38, wherein a telescoping slide mechanism is provided, so that said movable spray applicator dispenser moves linearly, instead of arcuately, as said swinging arm pivots about a pivot fulcrum point.

40. The device as in Claim 35, further comprising a speed control controlling the speed of the movement of said movable spray applicator dispenser.

41. The device as in Claim 40 further comprising a timer to vary the thickness of each layer of foam on a particular pass of said movable spray applicator dispenser over a predetermined portion of said surface.

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